Remarks of Benjamin H. Grumbles
Assistant Administrator for Water
U.S. Environmental Protection Agency
Climate Change and the
National Water Program

WEFTEC 2008
Chicago, IL
October 21, 2008

Introduction

Good afternoon. I was happy to accept the invitation to speak today because I saw the other distinguished speakers on this panel and I really wanted to hear what they had to say about the critically important topic of climate change and water resources. Seattle is a leader among municipalities addressing climate change and my friend, and former boss, Tracy Mehan has been in the forefront of those calling on water resources managers to come to grips with the challenges of a changing climate.

Some of you here today may be fans of the author Thomas Friedman and may even have read his now book "*Hot, Flat and Crowded*." He does a commendable job of assembling cutting edge thinking about large scale trends around the world, including climate change.

At one point in the book he states his major conclusion – that America cannot be the leader of the world without being the world's leader in conceptualizing, manufacturing and deploying clean power solutions. "Period. Full Stop. Over and out**."** I read that and thought: "OK, he got my attention."

So, to borrow from Tom Friedman, I want to say as clearly as I can that America cannot sustain the quality of our aquatic ecosystems and our drinking water in the context of a changing climate without being a world leader in conceptualizing how to protect water resources as the climate changes and implementing the smartest adaptation policies. Period. Full Stop. Over and out.

We can now say with confidence that climate change:

- jeopardizes much of the success in restoring water quality and protecting drinking water over the past thirty-five years;
- demands major new efforts to rethink and reframe our existing water programs to adapt to the many complex challenges that climate change poses; and
- presents us with new problems -- such as loss of coastal wetlands to sea level rise, loss of drinking water supplies, and changing ocean chemistry -- that are at a scale and magnitude that have staggering, negative implications for the health of aquatic ecosystems.

Recognizing the Water Impacts of Climate Change

It is true that, until very recently, climate change was thought to be a problem for the air program, and not a topic likely to be discussed at a conference on water technology and policy. But today, the scientific consensus on climate change, and the new research concerning its impacts on water resources, has forced us to think about how

our traditional drinking water and clean water programs will be affected by a changing climate.

We owe a significant debt to both the Intergovernmental Panel on Climate Change and the U.S. Climate Change Science Program for the development of the solid scientific foundation documenting the impacts of climate change on water resources internationally and in the United States.

Over a year ago, I established an internal workgroup to look at all the new information about climate change impacts on water resources. This EPA workgroup, led by Mike Shapiro and Jeff Peterson in my office, developed a draft strategy describing the challenges water programs face in responding to climate change and proposing over forty specific actions to respond to these challenges. We took comments on the Strategy and published it in final form this September.

I want to take a few minutes to review some of the key impacts of climate change on water resources and then describe some of the actions we are proposing to take in the Strategy.

Climate Change Impacts on Water

Climate change will have numerous and diverse impacts, including impacts on human health, natural systems, and the built environment. In the case of climate change and water, there is bad news and then more bad news. Unfortunately, many of the consequences of a changing climate relate to water resources, including:

- warmer air and warmer water;
- change in the location and amount of rain and snow;
- increased intensity of storms and rainfall;
- sea level rise; and
- changes in ocean characteristics and chemistry.

It would be wonderful if some of all of these climate driven changes in water resources somehow supported healthier aquatic ecosystems – but the second case of bad news is that almost all these climate change impacts on water resources make protecting water resources much harder.

How will climate change make protecting water resources harder? The challenges to water program managers will vary across different parts of North America, but can be briefly summarized as follows:

Increases in Water Pollution Problems: Warmer air temperatures will result in warmer water. Warmer waters will:

- hold less dissolved oxygen making instances of low oxygen levels and "hypoxia" more likely; and
- foster harmful algal blooms and change the toxicity of some pollutants.

The number of waters recognized as "impaired" is likely to increase, even if pollution levels are stable.

More Extreme Water-Related Events: Heavier precipitation in tropical and inland storms will:

- increase the risks of flooding;
- increase the variability of streamflows;
- increase the velocity of water during high flow periods; and
- increase erosion.

These changes will all have significant adverse effects on aquatic system health.

Changes to the Availability of Drinking Water Supplies: In some parts of the country, droughts, changing patterns of precipitation and snowmelt, and increased water loss due to evaporation as a result of warmer air temperatures will result in changes to the availability of water for drinking. Warmer air temperatures may also result in increased demands on drinking water supplies and the water needs for other uses are likely to increase.

Waterbody Boundary Movement and Displacement: Rising sea levels will move ocean and estuarine shorelines by inundating lowlands and displacing wetlands. Changing water flow to lakes and streams, increased evaporation, and changed precipitation in some areas, will affect the size of wetlands and lakes. Water levels in the Great Lakes are expected to fall. A study of the mid-Atlantic states concluded that land available for inland migration of coastal wetlands is only twenty percent of the area of the existing wetlands.

Changing Aquatic Biology: As waters become warmer, the aquatic life they now support will be replaced by other species better adapted to the warmer water (i.e., cold water fish will be replaced by warm water fish). This process, however, will occur at an uneven pace disrupting aquatic system health and allowing non-indigenous and/or invasive species to become established. In the long-term (i.e., 50 years), warmer water and changing flows may result in significant deterioration of aquatic ecosystem health in some areas.

Collective Impacts on Coastal Areas: Most areas of the United States will see several of the water-related effects of climate change, but coastal areas are likely to be hardest hit. These impacts include sea level rise, increased damage from floods and storms, changes in drinking water supplies, and increasing temperature and acidification of estuaries and the oceans.

Water Program Climate Change Strategy

Responding effectively to any one of the six major impacts I have just listed would be a tough test for water programs. Responding effectively to all of them at the same time is a huge challenge. But, we really have no choice, and the sooner we start, the better.

That is where the National Water Program Strategy we just published comes in. The Strategy is an initial effort to:

- describe climate change impacts on water programs;
- define goals and objectives for responding to climate change; and
- identify a comprehensive package of specific response actions.

This document expresses the National Water Program's commitment to work in cooperation with national partners, State and local government, and public and private stakeholders to understand the science, develop tools, and implement actions to address the impacts of climate change on water resources. You can find the final Strategy our website at: www.epa.gov/water/climatechange, along with lots of other useful information.

More specifically, the draft Strategy identified goals in five key areas:

- contributing where we can to mitigating release of greenhouse gases;
- helping water programs adapt to climate change;

- strengthening the links between water program managers and the research community to focus new research on the most critical questions;
- educating water program managers about climate change and its impacts on aquatic systems; and
- creating the management capacity within the National Water Program to successfully engage climate change issues.

Each of these five goals is supported by more specific objectives and "Key Actions." Of the 44 key actions, the majority relate to the challenges we face in adapting water programs to climate change. Some of these key actions involve existing water program work that has climate change implications, while other actions involve new activities, or changes in the direction of current activities, in response to climate change.

Crosscutting Themes of Adaptation Actions

I want to tell you about some specific actions that we will be taking in a moment, but first I want to share some several of the crosscutting themes that emerged from this work.

Information and Data: A key crosscutting theme is the need to develop data to adapt to climate change. Water managers need information and baseline data to understand how climate change is altering the environment and inform long-term planning. This problem come up repeatedly, whether it is the need for more refined topographic data to project inundation areas from sea level rise, or the need for better projections of changes in streamflow, or the need for baseline data on the exact location of freshwater wetlands.

Analytic Tools: But, just getting the right data is not enough. A second crosscutting theme is the need to develop new analytic tools to use the data to understand and address water resource impacts of climate change. Highly accurate laser-based "LIDAR" topographic data is not useful unless we have the sea level inundation mapping tools to make the data meaningful to State planners and local decision-makers. The most current streamflow data is not useful to permit writers unless they have the permit writing guidance to apply the data correctly.

We have made real progress here with tools like our BASINS computer modeling tools. But we need to look across the clean water and drinking water programs and make sure that new data is consistently supported by the analytic tools that make the data useful, not just to technical experts in Washington, but to water program professionals in Federal, State, and local governments thought the country.

Prepare for Extreme Water Related Events: Another crosscutting theme is the need to expand planning for extreme water related events. We expect that a warmer climate will bring more intense storms and precipitation, and thus greater likelihood of flooding in both coastal and inland locations. On the other side of the equation, we also expect some areas to have significantly less water. It is true that we have always planned for emergencies and unforeseen events. But, climate change will increase the likelihood of these events and the scale of the damaging impacts and we need to recalibrate accordingly.

Extremes in climate demand a greater investment in vulnerability assessment and in building the resiliency of both man-made water infrastructure and of aquatic ecosystems. Without this investment, we risk damaging interruptions in drinking water and

wastewater treatment services and irreversible damage to the condition of watersheds and the water quality and drinking water supplies they support.

Build Watershed Resilience: A fourth crosscutting theme involves steps to increase the resilience of watersheds. I already mentioned the impacts of more extreme water related events. But, we also need to adapt to the gradual shifts in water temperatures, sea levels, intensity of rainfall, soil moisture, estuarine salinity, ocean chemistry, and waterbody boundaries that will occur as the climate warms. With these gradual, but persistent and diverse, impacts in mind, we need to develop defensive measures that buffer and soften the blows.

We currently have some tools here, including the existing stormwater permit program, the WaterSense water conservation program, and the wetlands protection program. We need to think about how these programs can be better focused on building the capacity of aquatic ecosystems to adjust to climate driven changes. For example, how can the stormwater permit program encourage green infrastructure that will improve stormwater management to reduce variability in streamflows? And, we need to come up with creative and new ways to protect and restore the resiliency of watersheds.

Some Specific Response Actions

With these themes in mind, we looked at each of the five goals I mentioned earlier and identified a wide range of possible actions. We started with a lot of ideas, but we boiled them down over several months to 44 specific response actions. In this process, we had great input from EPA Regional offices, from a range of stakeholder groups, and from the public. I want to emphasize that we are committed to initiating each of these actions in the two year period of FY 2008 and 2009.

So, starting with key action number 1…. No, seriously, I do not have time to describe all 44 key actions. But I do want to give you a sense of what we are doing and I have picked three actions to talk about.

Climate Ready Estuaries: We have launched a new program that we are calling "Climate Ready Estuaries." This is key action number 22 in the Strategy. The idea here is to work with six of the 28 estuary programs in the National Estuary Program to pilot the development of plans for responding to the challenges of climate change in each estuary. We see this project as a laboratory for developing new ideas and models that can be helpful to other estuary programs and to the development of climate change response plans on a watershed basis throughout the country.

The six estuaries we are working with are: Albemarle-Pamlico estuary in North Carolina, Charlotte Harbor in Florida, Massachusetts Bay, New Hampshire estuaries, Delaware estuaries, and San Francisco Bay. Each of these estuary programs will assess climate change vulnerabilities, develop and implement adaptation strategies, engage and educate stakeholders, and share the lessons learned with other coastal managers.

The Climate Ready Estuaries website offers information on climate change impacts to different estuary regions, access to tools and resources to monitor changes, and information to help managers develop adaptation plans for estuaries and coastal communities. You can find the website at www.epa.gov/cre.

Utility Climate Vulnerability Handbook: A second key action I want to highlight for you is development of a handbook to help water utilities conduct self-assessments of sustainability, including a climate change-specific vulnerability assessment. This is key action number 29 in the Strategy.

One of frustrating aspects of responding to climate change is the lack of climate change projections that "downscale" estimates of environmental changes – such as temperature, precipitation, and sea level rise – from the large regional scale to the smaller scale that local utilities find useful.

There is a lot of work going on now to develop models to deliver more precise and focused impact projections, but the lack of perfect data should not prevent taking simple actions that move in the right direction and that can be fine-tuned as more detailed data comes along.

The idea of the climate change vulnerability assessment for local water utilities is to help them start to factor this new information into their planning. Given the long lifespan of drinking water and wastewater infrastructure, it is prudent that planning for existing and new facilities include climate change information. We hope to have a draft handbook available
early next year.

Interagency Climate/Water Coordination Group: The third response action that I want to talk about is the creation of a new Federal interagency coordination group to address climate change and water issues. Thhs is key action number 44 in the Strategy.

The more I learned about the impacts of climate change on water, the more I realized that EPA, acting alone, could tackle only a small part of the problem. To get any real traction, we need the help of State and local governments and stakeholders, as well as the active support of other Federal agencies.

In March of this year, I convened a meeting of leaders from five Federal agencies directly involved in protecting water resources -- NOAA, the Army Corp of Engineers, the Department of Agriculture, the Department of the Interior, along with EPA. We agreed that we were all actively engaged in addressing climate change issues and that we needed a forum for coordinating these efforts.

In August, the five Federal agencies signed a joint memorandum charging senior staff from each agency to establish a workgroup on climate change and to work together to address the challenges of a changing climate. We are working now to expand the number of Federal agencies working with this group and to develop an agenda of high priority actions. The joint Federal agency memorandum is available on the national water program climate change website at: www.e.a.gov/water/climatechange.

Next Steps

Now that we have published the final Strategy, where do we go from here? Well, I am happy to report that, for much of the past year, we have been implementing many of the key actions proposed in the draft Strategy, so we have a running start. But we have a lot of work to do.

To help organize the work, we have developed an implementation plan – in effect a blueprint for operational implementation of the Strategy. The implementation plan describes the key actions in more detail, identifies interim milestones and schedules, and indicates staffing and resources. This implementation effort is overseen by an executive level Steering Committee chaired by Deputy Assistant Administrator Mike Shapiro and includes each of the water program office directors and several regional water division directors.

Given the serious management attention we are giving this work, I am expecting to see some pretty impressive results in the near future. We have made a commitment to

reporting progress of this effort. I have asked for a status report on work completed in FY 2008 to implement the Strategy and I expect to make that report public later this year. Interest is intense with practitioners, stakeholders, local and state officials, Congress and others. International interest is high as well.

Conclusion

We recently hosted a delegation of water experts from China and an ancient Chinese proverb seems to sum up where we are right now with climate change and water: "Unless we change our direction, we are likely to end up where we are headed."

The traditional water programs that we all know and love so well were conceived without an inkling of understanding of the consequences of a changing climate for water resources and the health of aquatic systems. Knowing what we now know about climate change impacts on the health of aquatic systems, we as the water management community must "reboot" our thinking about water quality problems and how to solve them. Then we must reframe and rethink the programs to respond to the realities of climate change. And we must start now**.** To borrow again from Tom Friedman's optimism, "We have just enough time, if we start now." EPA has already begun.

Our Strategy on climate change and water is an initial attempt to reframe clean water and drinking water program with climate change clearly in mind. But, it is just the first step in defining the changes we need to make and it will need to be rewritten every few years for years to come.

My request to you today is that you take the time to read the final Strategy and think about how it may apply to the water programs or operation that you run. The EPA will not be able to respond to these challenges alone. It has to be a team effort. Every partner makes a difference. We will need the constructive engagement of the entire community of water resource professionals.

Please join us in this effort. Again, you can find the Strategy at: www.epa.gov/water/climatechange/.

Thank you.